

REMARKS

Claims 1-79 are pending in the Application. Claims 38, 40 and 59 are currently amended. Claims 1-37, 44-46, 48-58 and 60-79 are withdrawn from consideration.

Claim Objections

The Examiner objected to claim 40 for clarity reasons. More specifically, the Examiner asserted that it is unclear from the claim language if the position of print head is what applicant intends to claim.

Claim 40 is amended so as to recite: "said matrix is arranged into a substantially rectangular printing area dimensioned to give simultaneous printing coverage of standard sized printing media *upon being placed substantially over said standard sized printing media*".

It is respectfully maintained that Claim 40 as currently amended is clear, and should be allowed.

Claim Rejections – 35 USC 102

The Examiner rejected claims 38-39, 42, and 59, under U.S.C. 102(e) as being anticipated by Hsu et al (US Patent No. 6,652,068), hereinafter referred to as Hsu.

As described in the Field of Invention section, the present ~~application~~ relates to an ink jet printing method and apparatus.

The present application teaches the novel and inventive idea of an ink jet printing head which comprises a plurality of local reservoirs, where each local reservoir is

associated with one or more nearby nozzles, and supplies ink to the nearby nozzles by capillary action. For example, the present invention describes in the first paragraph of the Summary of Invention section: "According to one aspect of the present invention there is provided an ink jet print head comprising a plurality of nozzles for controlled formation and release of ink drops for printing. In the print head, each nozzle is associated with a local ink storage reservoir for replenishment of the nozzle with ink. As will be explained below the local storage reservoir serves the purpose of feeding ink to at least one nozzle by capillary action. It is therefore appropriate that the local ink storage reservoir is open to environmental pressure, in contrast to conventional systems..."

Hsu, as described in the Field and Background of the Invention Section, relates to the field of ink jet print heads and associated ink delivering method, and more particularly, to a high-density ink jet print head having a two-directional central ink flow channel and a one-directional periphery ink flow channel.

Claim 38, as currently amended, defines an ink jet print head comprising a print head matrix, the matrix having a plurality of nozzles for bubble formation and expulsion opening onto a print side surface of the matrix and a plurality of local reservoirs, wherein each of the local reservoirs is configured to supply ink to at least one respective *nearby nozzle* of the nozzles by *capillary action*, the local reservoirs opening onto an ink supply surface of the matrix.

As described hereinabove, and defined by claim 38, preferred embodiments of the present invention introduce the novel and inventive idea of an ink jet printing head which comprises a plurality of reservoirs, where each local reservoir is a *local*

reservoir associated with one or more nozzles positioned in vicinity of the local reservoir, as described in the Summary of Invention, on page 21, in lines 19-22: "Within the matrix, the ink jet nozzles are constructed with local ink storage reservoirs that feed nearby ink jet nozzles. *The local reservoir is located in the vicinity of one or more ink jet nozzles that it feeds* and is preferably open to atmospheric pressure at the reverse, that is non-printing, side of the matrix". An exemplary embodiment illustrated using FIG. 15B includes a series of reservoir-nozzle pairs. Each of the nozzles of FIG. 15B has its own reservoir, opened to the nozzle, and the nozzles and reservoirs are provided at a predetermined density over the matrix.

The novel and inventive idea of ink jet nozzles constructed with ink storage reservoirs, each reservoir being a *local* reservoir feeding nearby jet nozzles *by capillary action*, facilitates for the first time, ink drop ejection onto printing media under substantially unregulated pressure conditions. By contrast, current ink jet technology relies on the supply of ink using channels (i.e. tubes connecting nozzles to an ink reservoir) under strict pressure and flow conditions inside the ink chamber part of the nozzle.

By facilitating ink drop ejection onto printing media under substantially unregulated pressure conditions, the present invention overcomes several of the problems associated with current ink jet technology, such as: chronic loss of operating nozzles, the creation of satellite drops, the wet and dry phenomenon, etc., described in further detail by the present application on page 9, line 19 – page 12, line 3.

Further, having a local reservoir directly open to the nozzles in the vicinity of the local reservoir, rather than a reservoir supplying ink to the nozzles through tubes, facilitates the construction of an ink jet print head comprising a large print head

matrix (say, the size of a standard printing media). The matrix has a plurality of nozzles for bubble formation and expulsion opening onto a print side surface of the matrix, as taught by the present invention and defined by claim 38. Such a large matrix cannot be constructed using traditional print heads, where tubes are used to push ink from central ink reservoirs to the nozzles, as the number of nozzles that can be connected using channels (i.e. tubes) to the central reservoir is limited by strict pressure and flow conditions, as described hereinabove.

Hsu describes a print head, which has a substrate, a nozzle layer, and a plurality of bubble generators. A plurality of first chambers and a plurality of second chambers are formed between the nozzle layer and the top of the substrate. A central ink flow channel and a periphery ink flow channel for delivering ink to the chambers are formed in the substrate. As described in the Abstract, a characteristic of the Hsu print head involves positioning the central ink flow channel and the periphery ink flow channel together on the substrate so that the amount of the nozzles per unit area of the print head is increased.

~~The Examiner referred to Hsu's Fig. 16 and column 5 lines 47-53, and asserted that Hsu teaches the print head with a plurality of local reservoirs (132, 134, 136, 196, and 216, Fig. 16).~~

~~However, as shown in Hsu's Fig. 16 and explained in column 5 lines 47-53, the ink is supplied from a central reservoir(s) (132, 134, 136, 196, and 216) to the nozzle layer through channels (212, 104, 108) spread on the whole printing head rather than to nozzles positioned nearby local reservoirs. The use of channels to supply ink from a central reservoir to the nozzles has many disadvantages, and limits the size of the print head, as described in further detail hereinabove.~~

~~Hsu never describes or even hints at the novel and inventive idea of a print head having~~ a plurality of local reservoirs, wherein each of the local reservoirs is configured to supply ink to at least one respective *nearby nozzle* of the nozzles by *capillary action*, the local reservoirs opening onto an ink supply surface of the matrix, ~~as taught by the present application and defined by claim 38.~~

It is thus respectfully maintained that claim 38 as currently amended is novel over Hsu, and should be allowed.

Claim 59, as currently amended, defines an ink jet printing head comprising a plurality of nozzles for forming and expelling ink droplets for printing onto a print medium, wherein the plurality of nozzles is arranged into a two dimensional grid substantially to be coextensive with a standard size print medium, the ink *jet printing head further comprises a plurality of local reservoirs, and each of the local reservoirs is configured to supply ink to at least one respective nearby nozzle of the nozzles by capillary action.*

As described hereinabove, Hsu never describes or even hints at the novel and inventive idea of an ink jet print head having *a plurality of local reservoirs, wherein each of the local reservoirs is configured to supply ink to at least one respective nearby nozzle by capillary action*, as taught by the present application and defined by claim 59.

Hsu rather uses long channels to supply ink from a central reservoir to multiple nozzles, and does not have local reservoirs opening into nearby nozzles, and supplying ink to the nearby nozzles by capillary action. The use of the channels is

associated with many disadvantages, and limits the size of the print head, as described in further detail hereinabove.

It is thus respectfully maintained that claim 59 as currently amended is novel over Hsu, and should be allowed

The remaining claims mentioned in the Office Action are believed to be allowable as being dependent on an allowable main claim.

All of the matters raised by the Examiner have been dealt with and are believed to have been overcome.

In view of the foregoing, it is respectfully submitted that all the claims now pending in the application are allowable.

An early Notice of Allowance is therefore respectfully requested.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Martin D. Moynihan".

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Enclosure:

Petition for Extension of Time (1 Month)